Dimensions

	Position of the light spot
DK12-11	1 mm x 3 mm
DK12-11/A	3 mm x 1 mm

Model Number

DK12-11-IO/92/136

Print mark contrast sensor
with M12, 4-pin metal connector

Features

- IO-link interface for service and process data
- Diffuse mode sensor for recording any print mark
- TEACH-IN, static and dynamic
- 40 µs response time, suitable for extremely rapid scanning processes
- 3 emitter colors: green, red and blue

Product information

The contrast sensor DK12 with an IO-Link interface makes
continuous communication with the diagnosis system and the parameter assignment up to the sensor level available for the first time. That way it is ensured that the intelligence which is already integrated in each DK12-contrast sensor, is harnessed to the full. This will offer a number of special advantages during service (remedial action, maintenance und device exchange), commissioning (cloning, identification, configuration and localization) or during operation (change of job, continuous parameter monitoring und online diagnosis).
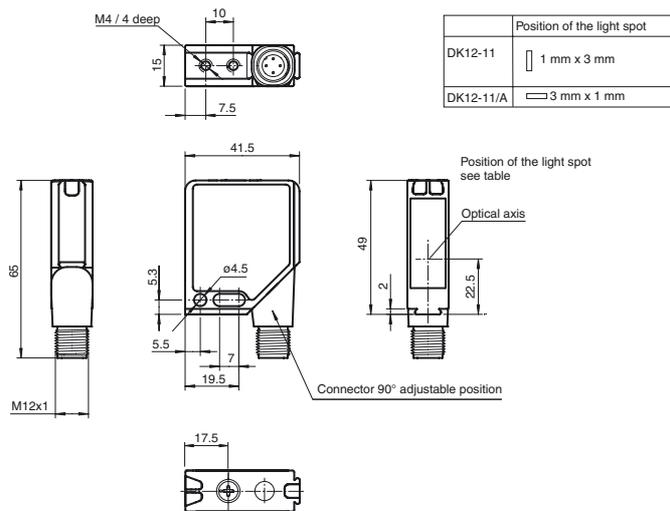
Electrical connection

○ = Backround
● = Mark
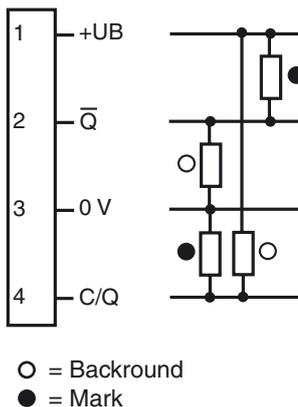
Pinout
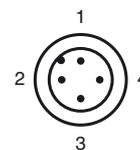
Indicators/operating means
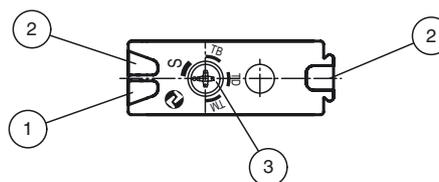
1	Operating display green
2	Switch state yellow
3	Teach-In switch

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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Technical data

General specifications

Sensor range	11 mm ± 2 mm
Light source	3 LEDs (R,G,B)
Light type	Visible green/red/blue, modulated light
Light spot representation	1 mm x 3 mm , light spot parallel to housing
Angle deviation	max. ± 3°
Teach-In	static and dynamic Teach-In

Indicators/operating means

Operation indicator	LED green, statically lit Power on , Undervoltage indicator: Green LED, pulsing (approx. 0.8 Hz) , short-circuit : LED green flashing (approx. 4 Hz) , IO link communication: green LED goes out briefly (1 Hz)
Function indicator	2 LEDs yellow, light up in case of detection
Teach-In indicator	Teach-In mark: LED green/yellow equiphase flashing; 2,5 Hz . Teach-In background: LED green/yellow non equiphase flashing; 2,5 Hz . Teach-In dynamic: LED green/yellow equiphase flashing; 1.0 Hz . Teach Error:LED green/yellow non equiphase flashing; 8.0 Hz .
Control elements	Teach-In rotary switch for Switching operation, Teach-In mark, Teach-In background and dynamic Teach-In

Electrical specifications

Operating voltage	U_B	10 ... 30 V DC / when operating in IO-Link mode: 18 ... 30 V
Ripple		10 %
No-load supply current	I_0	≤ 60 mA at 24 V supply voltage

Interface

Interface type	IO-Link
Protocol	IO-Link V1.0
Mode	COM 2 (38.4 kBaud)

Output

Switching type		light/dark on
Signal output		2 push-pull (4 in 1) outputs, complementary, short-circuit proof, reverse polarity protected
Switching voltage		max. 30 V DC
Switching current		max. 100 mA
Switching frequency	f	12.5 kHz
Response time		40 µs

Ambient conditions

Ambient temperature	-20 ... 60 °C (-4 ... 140 °F)
Storage temperature	-40 ... 75 °C (-40 ... 167 °F)

Mechanical specifications

Degree of protection	IP67
Connection	4-pin, M12 metal connector , can be rotated 90°
Material	
Housing	Frame: nickel plated, die cast zinc, Laterals: glass-fiber reinforced plastic PC
Optical face	Plastic pane
Mass	60 g

Compliance with standards and directives

Standard conformity	
Product standard	EN 60947-5-2:2007 IEC 60947-5-2:2007

Approvals and certificates

Protection class	II, rated voltage ≤ 250 V AC with pollution degree 1-2 according to IEC 60664-1
UL approval	cULus Listed , Class 2 power source
CCC approval	CCC approval / marking not required for products rated ≤36 V

Accessories

DK12-11 IODD
IODD for communication with DK12-11-IO-Link sensors

IO-Link-Master-USB DTM
Communication DTM for use of IO-Link-Master

PACTware 4.X
FDT Framework

IODD Interpreter DTM
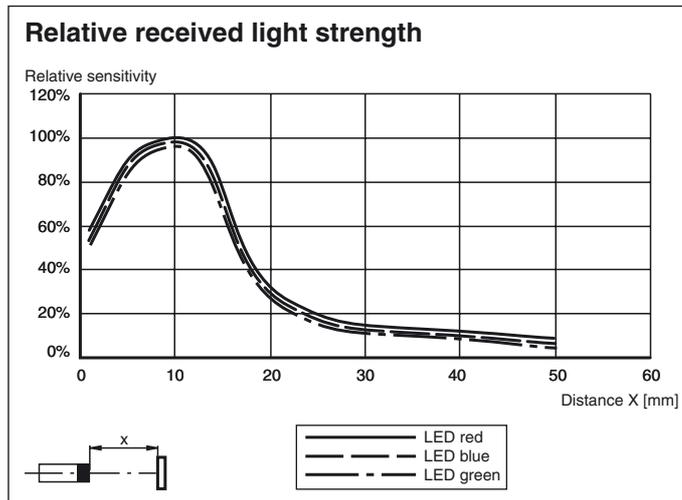Software for the integration of IODDs in a frame application (e. g. PACTware)

IO-Link-Master02-USB
IO-Link master, supply via USB port or separate power supply, LED indicators, M12 plug for sensor connection

DK12-11-IO-Link DTM
Device DTM for communication with DK12-11-IO-Link sensors

Additional accessories can be found in the Internet.

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Relative received light strength

Relative sensitivity

Distance X [mm]

- LED red
- LED blue
- LED green

IO-Link Description

IO-Link is a standard for uniform linking of communications-capable sensors and switching devices to the control level by means of an economical point-to-point connection.

IO-Link provides a bidirectional point-to-point link between I/O modules and field device that combines serial communication in half-duplex mode for transferring process data, parameterization, diagnostic evaluation, and power supply. Communication is based on a master-slave structure in which the master controls the interface access to the slave (device) cyclically.

IO link function

The IO link operating mode is indicated by the green LED indicator with a short interruption (f = 1 Hz). IO link communication simultaneously provides process data (measurement data from the sensor) and access to requirement data.
The requirement data contains the following information:
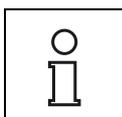
Identification:
- Manufacturer information
- Product ID
- User-specific ID

Device parameters:
- Teach-in parameters
- Operating parameters
- Configuration parameters
- Device commands

Diagnostic messages and warnings

Setting information

ⓘ	If the object surface is reflective or shiny, the sensor should be angled at approx. 10° to the surface of the material.

Teach-In using the rotary switch

Teach-In using the rotary switch in four positions - switching operation, Teach-In Mark, Teach-In Background and dynamic Teach-In.

To change the switch position, a time lock of approximately 2 seconds must be adhered to in each case. This means that the rotary switch must remain in a new position constantly for 2 seconds in order that the mode requested is accepted by the sensor (indicated by a change in the flashing function of the display LEDs).

Static Teach-In

The mark or the background can be taught-in in static Teach-In mode (TM/TB), either together (in any order) or separately. Therefore it is not mandatory to always teach-in the mark and the background.

TM position (Teach-In Mark)

For teaching-in the mark, when the rotary switch remains in the TM position constantly for 2 seconds.
The green and the yellow display LEDs flash simultaneously after teach-in has been completed (f = 2.5 Hz).

TB position (Teach-In Background)

For teaching-in the background, when the rotary switch remains in the TB position constantly for 2 seconds.
The green and the yellow display LEDs flash alternately after teach-in has been completed (f = 2.5 Hz).

Dynamic Teach-In

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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TD position (<u>T</u>each-In <u>D</u>ynamic)

The dynamic Teach-In operation begins when the rotary switch remains in the TD position constantly for 2 seconds. Values are then transferred continually. The first signals received after changing to "Dynamic Teach-In" mode are interpreted by the sensor as background. The largest deviation from the background during the entire "Teach-In Dynamic" mode is interpreted as a mark.

During "Teach-In Dynamic" mode, the green and yellow display LEDs flash simultaneously at f = 1 Hz.

The dynamic Teach-In operation finishes when the rotary switch remains in a new position constantly for 2 seconds.

Switching mode

S position (<u>S</u>witching Mode)

Ending the current Teach-In mode, evaluation of the received signals of all 3 transmitter light colors for mark and background.

a.)   Teach-In successful --> switching mode
Selection of the most favorable transmitter light color for the taught-in contrast.
The switching threshold is set midway between the mark and the background.
The Q1/PNP and Q2/NPN outputs become active when the taught-in mark is detected.

b.)   Alarm function
The taught-in contrast is too low for all 3 transmitter light colors. Automatically changes to switching mode with the last valid values for mark and background.
The yellow and green display LEDs flash alternately at f = 8 Hz for approx. 7 seconds.

For parameterization and diagnosis, the sensor can be addressed via the integrated IO link interface. This interface transmits process data in a cyclic manner, and diagnosis data acyclically. For this, connect the sensor to an IO link master and connect the relevant master port to the IO link device. When communication is established successfully, the green operation display LED flashes briefly every 1 s. The sensor can then be configured or diagnosed by the overlying application and send its process data.

The sensor parameters are device-specific and are described in the standardized IO Device Description file (IODD). The IODD can be read into different engineering tools using IODD support from different system providers. The sensor can then be configured or diagnosed using the relevant tool and a user interface generated from the IODD.

The IODD device description, FDT framework application and IODD interpreter are available in the corresponding product description under Software on our homepage, www.pepperl-fuchs.com.

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